

REMARKS

Claim Rejections Under 35 USC § 112

Claims 17 - 24 are rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which applicant regards as the invention.

In particular, the Examiner submits that there is no antecedent basis for the term “the ferrite shield” in line 10 of Claim 17. Independent Claim 17 has been amended to recite “the magnetic field shield” in place of “the ferrite shield” on line 10. Claims 18 - 24 which depend from Claim 17 were said to lack antecedent basis in view of the defect in Claim 17. The amendment of Claim 17 to correct for the defect effectively remedies Claims 18 - 24.

The Examiner also submits that there is no antecedent basis for the term “its upper surface” in ~~Claim 21. Claim 21 has been amended to recite “an upper surface of the magnetic field shield”.~~

In light of the amendments to Claims 17 and 21, applicants respectfully request withdrawal of the rejection of Claims 17 - 24 under 35 USC § 112, second paragraph.

Claim Rejections Under 35 USC § 102

Claims 17 - 24 are rejected under 35 USC § 102(b) as being anticipated by U.S. Patent No. 5,079,428, to Da Lin et al.

Applicants respectfully submit that applicants’ Claims 17 - 24 are not anticipated by the Da Lin et al. reference, and that further, there is not even a suggestion of applicants’ invention in the Da Lin et al. reference.

The Da Lin et al. reference describes an electron microscope with an asymmetrical immersion lense. (Title) The electron microscope generally makes use of an electron beam axis which is constant, while the specimen to be investigated is moved past the beam optical axis on a movable non-magnetic holder. This is shown at Col. 3, lines 35 - 41 in combination with Figure 1. In an

alternative embodiment which is shown in Figure 5, there are scanning coils 50 for scanning the primary electron beam over specimen 28, but these scanning coils are very limited in the area which can be scanned. The scanning is illustrated in Figure 5, where the beam still passes along a generally straight axis from the source with only the end of the beam being deflected a slight amount for scanning and then exiting through a narrow aperture at the bottom of pole piece 14. (Col. 7, lines 1 - 25.) At Col. 7, lines 16 - 21, the Da Lin et al. reference recites: "The beam is finally defined by a final aperture 62. The specimen holder 20 is supported by an x-y-z translator 64 so as to allow both specimen placement near the tip of the conical pole piece 14 and to scan different areas of the specimen 18".

By contrast, applicants' invention pertains to a charged particle lithography system, where the axis of the charged particle beam is shifted using deflector coils so that the beam can scan the entire target. (~~Specification, Page 5, lines 22 - 26 and Figure 3A in combination with the Specification Page 5, lines 18 - 26.~~) There is no narrow aperture through which the deflected beam is confined. As a result, as described in applicants' Specification at Page 2, lines 4 - 25, the varying deflection magnetic field is sufficiently large that it creates eddy currents in electrically conductive system components downstream from the deflection coil. (Specification, Page 2, lines 19 - 25).

The purpose of applicants' invention is to prevent the eddy currents from radiating into electrically conductive components of the system downstream from a beam axis deflection coil, without adversely affecting the focusing magnetic field. (Specification, Page 3, lines 1 - 4.) Applicants confine the magnetic field generated by the beam axis deflector coil downstream of the deflection coil using a magnetic field shield which is located coaxial to and downstream with regard to propagation of the beam from the deflection coil. Applicants' Claim 17 has been amended to make it clear that the immersion lens assembly is a variable axis immersion lense assembly, as distinguished from a fixed axis lense assembly.

In addition, to reduce the affect of the magnetic field shield on the focusing magnetic field of the charged particle lithography system, the magnetic field shield is typically located such that an upper surface of the shield is at least approximately parallel to a magnetic equipotential surface of the magnetic field which is used to focus the beam (generated by the excitation coil), as claimed in Claim 21, and as described in applicants' Specification at Page 3, lines 7 - 25.

With respect to comments present in the office action, applicants respectfully submit that element 24 is not a deflection coil, but is instead a magnetic housing which acts as a second pole piece. There is no mention at Col. 4, lines 35 - 50 of a deflection coil. Figures 1 and 3 of the De Lin et al. reference clearly do not show any deflection of the beam, which is illustrated as element 12. Further, it is evident from looking at all of the Figures which illustrate the apparatus, Figures 1, 3, 4, and 5, that the aperture through which the beam travels is very small and that the beam cannot be ~~deflected in a manner which will permit travel across the major surface of the substrate 18.~~ To enable the beam to travel across the entire substrate surface, it is necessary to move the stage 20 upon which the substrate 18 resides. Thus, the Da Lin et al. reference does not describe or even suggest a variable axis immersion lens of the kind described by applicants and claimed in amended Claim 17. The problem to be solved for the variable axis immersion lense assembly, which generates eddy currents of large magnitude downstream of its deflection magnetic field, does not exist to any significant extent with respect to the De Lin et al. scanning electron microscope.

Further, the Examiner suggests that the pole piece 14 serves as a magnetic shield in the Da Lin et al. device. Even if the conical shaped lower portion of pole piece 14 were considered to shield the test specimen 18 and sample stage 20 from magnetic radiation produced above pole piece 14, this conical section is not located so that its upper surface is approximately parallel to a magnetic equipotential surface of a focusing magnetic field generated by an excitation coil.

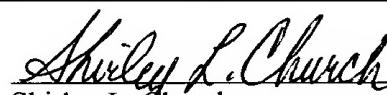
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In light of the above distinctions, applicants respectfully request withdrawal of the rejection
of Claims 17 - 24 under 35 USC § 102(b), over Da Lin et al.

Applicants believe that the presently pending claims as amended are in condition for allowance, and the Examiner is respectfully requested to enter the present amendments and to pass the application to allowance.

The Examiner is invited to contact applicants' attorney with any questions or suggestions, at the telephone number provided below.

Respectfully submitted,



Shirley L. Church
Registration No. 31,858
Attorney for Applicants
(650) 473-9700

Correspondence Address:
Patent Counsel
Applied Materials, Inc.
P.O. Box 450-A
Santa Clara, CA 95052